## What is claimed is:

- 1. A method for preventing damage to an anti-
- 2 reflective structure during removing an overlying
- 3 photoresist layer, comprising the steps of:
- 4 forming a nitrogen-free silicon oxide layer having a
- 5 refractive index of 1.4~1.7 overlying the anti-
- 6 reflective structure to serve as a protective
- 7 layer;
- 8 forming a patterned photoresist layer overlying the
- 9 nitrogen-free silicon oxide layer; and
- 10 removing the patterned first photoresist layer.
- 1 2. The method as claimed in claim 1, wherein the
- 2 anti-reflective layer contains no nitrogen.
- 3. The method as claimed in claim 1, wherein the
- 2 anti-reflective structure consists at least one silicon
- 3 oxvnitride laver.
- 1 4. The method as claimed in claim 1, wherein the
- 2 nitrogen-free silicon oxide layer is formed by plasma
- 3 enhanced chemical vapor deposition.
- 1 5. The method as claimed in claim 4, wherein the
- 2 nitrogen-free silicon oxide layer is formed from SiH4 and
- 3 CO<sub>2</sub>.
- 1 6. The method as claimed in claim 1, wherein the
- 2 nitrogen-free silicon oxide layer has a thickness of about
- 3 10~500 Å.

- 1. A method for preventing damage to an anti reflective structure during removing an overlying
- 3 photoresist layer, comprising the steps of:
- 4 forming a nitrogen-free silicon oxide layer having a
- 5 refractive index of 1.4~1.7 overlying the anti-
- 6 reflective structure to serve as a protective
- 7 layer;
- 8 forming a patterned photoresist layer overlying the
- 9 nitrogen-free silicon oxide layer; and
- 10 removing the patterned first photoresist layer.
  - 2. The method as claimed in claim 1, wherein the
    anti-reflective layer contains no nitrogen.
  - 1 3. The method as claimed in claim 1, wherein the
  - 2 anti-reflective structure consists at least one silicon
  - 3 oxynitride layer.
  - 1 4. The method as claimed in claim 1, wherein the
  - 2 nitrogen-free silicon oxide layer is formed by plasma
  - 3 enhanced chemical vapor deposition.
- 1 5. The method as claimed in claim 4, wherein the
- 2 nitrogen-free silicon oxide layer is formed from SiH4 and
- 3 CO2.
- 1 6. The method as claimed in claim 1, wherein the
- 2 nitrogen-free silicon oxide layer has a thickness of about
- 3 10~500 Å.

- 7. The method as claimed in claim 1, wherein the
- nitrogen-free silicon oxide laver has an extinction
- 3 coefficient of about 0~0.5.
- 8. The method as claimed in claim 7, wherein the
- 2 nitrogen-free silicon oxide layer is a silicon dioxide
- 3 layer.
- 9. The method as claimed in claim 7, wherein the
- 2 nitrogen-free silicon oxide layer is a silicon oxycarbide
- 3 laver.
- 1 10. A method for preventing damage to an anti-
- 2 reflective structure during removing an overlying
- 3 photoresist layer, comprising the steps of:
- 4 in-situ formation of a nitrogen-free silicon oxide
- 5 layer having a refractive index of 1.4~1.7 and an
- 6 extinction coefficient of 0~0.5 overlying a
- 7 nitrogen-free dielectric anti-reflective
- 8 structure to serve as a protective layer;
- 9 forming a patterned photoresist layer overlying the
  - nitrogen-free silicon oxide layer; and
- 11 removing the first patterned photoresist layer.
- 1 11. The method as claimed in claim 10, wherein the
- 2 nitrogen-free silicon oxide layer is in-situ formed by
- 3 plasma enhanced chemical vapor deposition.
- 1 12. The method as claimed in claim 11, wherein the
- 2 nitrogen-free silicon oxide layer is formed from SiH4 and
- 3 CO2.

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- 1 13. The method as claimed in claim 10, wherein the
- nitrogen-free silicon oxide layer has a thickness of about
- 3 10~500 Å.
- 1 14. The method as claimed in claim 10, wherein the
- 2 nitrogen-free silicon oxide layer is a silicon dioxide
- 3 layer.
- 1 15. The method as claimed in claim 10, wherein the
- 2 nitrogen-free silicon oxide layer is a silicon oxycarbide
- 3 laver.
- 1 16. A semiconductor device for preventing damage to an 2 anti-reflective structure during removing an overlying
- 3 photoresist layer, comprising:
- a nitrogen-free dielectric anti-reflective structure
- 5 disposed overlying a substrate; and
- 6 a nitrogen-free silicon oxide layer having a refractive
- 7 index of 1.4~1.7 disposed overlying the nitrogen-
- 8 free anti-reflective layer to serve as
- 9 protective layer.
- 1 17. The semiconductor device as claimed in claim 16,
- 2 wherein the nitrogen-free silicon oxide layer has an
- 3 extinction coefficient of about 0-0.5.
- 1 18. The semiconductor device as claimed in claim 17,
- 2 wherein the nitrogen-free silicon oxide layer is a silicon
- 3 dioxide laver.

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- 1 19. The semiconductor device as claimed in claim 17,
- 2 wherein the nitrogen-free silicon oxide layer is a silicon
- 3 oxycarbide layer.
- 1 20. The semiconductor device as claimed in claim 16,
- 2 wherein the nitrogen-free silicon oxide layer has a
- 3 thickness of about 10~500 Å.